MARKED UP VERSION OF THE AMENDED CLAIMS
(Version with marking to show changes made)

1. (previously presented) A sensor device for detection of gases or vapors contained in air with a sensor element, wherein the sensor element exhibits a gas sensitive layer and wherein the sensor element is electrically heatable with a heating structure, and wherein the sensor element is disposed in an interior of a casing (40), which casing shields the sensor element (11) from air motions occurring outside of the casing (40), characterized in that the casing (40) exhibits a diffusion layer (47), wherein a passage of gas and vapor from the outside into the interior of the casing (40) and vice versa is possible through the diffusion layer (47) by diffusion, and wherein the casing (40) and the diffusion layer (47) are constructed heat insulating or thermally insulating.

2. (previously presented) A sensor device according to claim 1 characterized in that the diffusion layer (47) is formed out of a sinter material with a glass like or metallic structure.

3. (previously presented) A sensor device according to claim 1 characterized in that the diffusion layer is formed out of a gas permeable plastic foil.

4. (previously presented) A sensor device according to claim 1 characterized in that the sensor element (11) is a metal oxide sensor.

5. (previously presented) The sensor device according to claim 3 characterized in that the gas permeable plastic foil comprises Teflon (PTFE) , wherein the gas permeable plastic foil is tightly attached to a casing jacket (48) .

6. (previously presented) The sensor device according to claim 1 characterized in that the sensor element (11) exhibits a heating structure (32) for the electrical heating of the sensor element, wherein the heating structure is connected to connection wires (44) and wherein the connection wires pass into the casing through a casing floor (45).

7. (previously presented) The sensor device according to claim 6 characterized in that the heating structure (32) is a structured platinum layer.

8. (previously presented) Method for operating a sensor element for detection of gases or vapors contained in air, wherein the sensor element

exhibits a gas sensitive layer and wherein the sensor element is electrically heatable by way of a heating structure, characterized in that the temperature of the sensor element (11) is automatically controlled and the temperature set point value is at least part-time changed by way of turning a perturbation value switch on depending on the size or the time behavior of the sensor signal.

9. (previously presented) Method according to claim 8 characterized in that the sensor signal is compared with reference value formed slidingly or adapted out of sensor signals of times past, wherein the difference between the sensor signal and the reference value and/or the time behavior of this difference is employed for triggering a switching signal.

10. (previously presented) Method according to claim 8 characterized in that the electrical resistance of the heating structure (32) furnished with a temperature coefficient is employed as an automatic control value for the temperature of the sensor element (11).

11. (previously presented) Method according to claim 8 characterized in that the temperature of the gas sensitive layer (33) is not maintained constant

but a perturbing value switch on increasing the temperature of the gas sensitive layer (33) is performed depending on the time behavior of the sensor signal such that such perturbing influences, which are caused by changes of the physical surrounding conditions are distinguishable from such influences which are caused by a change of the gas composition or of the gas concentration based on the time behavior of the sensor signal.

12. (previously presented) Method according to claim 8 characterized in that the heating power is influenced for short time by the sensor signal by way of the perturbing value switch on that a change of the sensor signal, which is caused by a change of the air humidity or by a change of the air temperature is compensated quicker and/or to a larger extent as a change of the sensor signal which is caused by a change of the gas concentration.

13. (currently amended) Method according to claim 12 characterized in that a change of the sensor signal, which is caused by a change of the air humidity or [[at]] a change in the air temperature is distinguishable from a change of the sensor signal which is caused by a change in the gas concentration by way of the in each case different time behavior of the sensor signal.

14. (previously presented) Method according to claim 12 or 13 characterized in that the distinction between change of the sensor signal, which is caused by a change in the air humidity or by a change of the air temperature and a change of the sensor signal, which is caused by a change of the gas concentration is performed automatically by way of suitable software.

15. (previously presented) Method according to claim 8 characterized in that an average value is formed out of sensor signals from times past and that the reference value suitable for triggering a switching signal is formed out of the average value for the at each time actual sensor signal, wherein the average value formation is suspended for the time period of the perturbing value switch on.

16. (previously presented) Method according to claim 15 characterized in that the characterizing curve of the sensor element is taken into consideration for formation of the reference value.

17. (previously presented) Method according to claim 9 characterized in that the average value formation is suspended and the old reference value is

maintained for that time period during which the actual sensor value is smaller as the reference value formed out of the average value for detection of oxidizable air contents substances.

18. (previously presented) Method according to claim 15 characterized in that the average value formation is suspended and the old reference value is maintained for that time period during which the actual sensor value is smaller as the reference value formed out of the average value for detection of oxidizable air contents substances.

19. (previously presented) Method according to claim 15 characterized in that the time period of averaging taken into consideration for formation of the average value is variable.

20. (previously presented) Method according to claim 9 characterized in that the formation of the reference value is performed by taking into consideration sensor signals of times past, wherein the length of the time period taken into consideration is variable.

21. (currently amended) Method according to claim 9 characterized in that

the formation of the reference value is performed by taking into consideration reference values of times past, wherein the length of the time period ~~taking~~ taken into consideration in this context is variable.

22. (previously presented) Method according to one of the claims 19 through 21 characterized in that the length of the time period taken into consideration depends on the time behavior of the sensor signal.

23. (previously presented) Method according to claim 8 characterized in that the sensor signal is averaged at the same time over two different time periods, wherein a certain amount is subtracted from the average value formed over the longer time period and that a switching signal is triggered, when the average value formed over the shorter time period becomes smaller than the value resulting from the averaging over the longer time period and subtraction of the certain amount.

24. (previously presented) Method according to claim 8 characterized in that the temperature of the heating structure is periodically temporarily increased and the sensor signals are compared prior to, during, and after each temperature increase for a qualitative determination of a presence of

additional oxidizable or, respectively, reduceable air contents substances.

25. (previously presented) Method according to claim 8 characterized in that the change of the impedance of the gas sensitive layer (33) is employed for forming of sensor signal.

26. (previously presented) Method according to claim 8 characterized in that the change of the electrical resistance of the gas sensitive layer (33) is employed for formation of a sensor signal.

27. (previously presented) Method according to claim 9 characterized in that additionally a lower barrier is determined for the reference value, wherein the reference value can never undershoot the lower barrier and wherein the lower barrier cannot be reached by sensor caused variations, wherein the gas concentration which can be coordinated to this sensor signal does not inflict permanent damages to the human being or, respectively, is disposed in a far safety distance relative to the explosion barrier in case of for example a monitoring of explosion limits.

28. (previously presented) The sensor device according to claim 1

characterized in that the diffusion layer (47) is formed out of a sinter material with a glass like or metallic structure, wherein an inner chamber is formed between the diffusion layer and the sensor element.

29. (previously presented) The sensor device according to claim 1 characterized in that the diffusion layer is formed out of a gas permeable plastic foil, wherein the gas permeable plastic foil forms a cover face of the casing (40).

30. (previously presented) The sensor device according to claim 1 characterized in that the sensor element (11) is a metal oxide sensor, wherein the metal oxide sensor has a gas sensitive layer (33), wherein the gas sensitive layer surrounds an inner chamber of the casing (40).

31. (previously presented) The sensor device according to claim 6 characterized in that the heating structure (32) is a structured platinum resistance layer or a layer of another material exhibiting a pronounced temperature coefficient.

32. (new) A method for operating a sensor element for detection of gases or

vapors contained in air comprising the steps of:

furnishing a sensor element having a gas sensitive layer (33);

furnishing a heating structure for the gas sensitive layer and wherein the gas sensitive layer is heatable by way of a heating structure (32);

automatically controlling a temperature of the gas sensitive layer;

changing at least part-time a temperature set point value by way of turning a perturbation value switch on depending on a size of or a time behavior of a gas sensitive layer signal.

33. (new) The method according to claim 32 further comprising the step of:

comparing the gas sensitive layer signal with a reference value formed slidingly or adapted out of a gas sensitive layer signal of times past;

employing a difference between the gas sensitive layer signal and a reference value and/or a time behavior of this difference for triggering a switching pulse.

34. (new) The method according to claim 32 further comprising the steps of:

furnishing an electrical resistance of the heating structure (32) with a

temperature coefficient;

employing the electrical resistance having a temperature coefficient as an automatic control value for the temperature of the gas sensitive layer (33).

35. (new) The method according to claim 32 further comprising the steps;

not maintaining the temperature of the gas sensitive layer (33) at a constant value;

switching on a perturbing heating value for increasing the temperature of the gas sensitive layer (33) depending on a time behavior of the gas sensitive layer signal;

distinguishing perturbing influences, which are caused by changes of the physical surrounding conditions from influences which are caused by a change of a gas composition or of a gas concentration based on a time behavior of the gas sensitive layer signal.

36. (new) The method according to claim 32 further comprising the steps:

influencing a heating power for a short time by the gas sensitive layer signal;

switching on a perturbing heating value on for a change of the gas sensitive layer signal;

compensating quicker and/or to a larger extent a change of an air humidity or

a change of the air temperature as compared with a change of the gas sensitive layer signal which is caused by a change of the gas concentration.

37. (new) The method according to claim 36 further comprising the step: distinguishing a change of the gas sensitive layer signal, which is caused by a change of the air humidity or a change in the air temperature from a change of the gas sensitive layer signal which is caused by a change in a gas concentration by way of an in each case different signal behavior relative to time dependence of gas sensitive layer signal.

38. (new) The method according to claim 37 further comprising the step: performing automatically a distinction between a change of the gas sensitive layer signal, which is caused by a change in the air humidity or by a change of the air temperature and a change of the gas sensitive layer signal, which is caused by a change of the gas concentration by way of gas sensitive layer signal processing with software capable to furnish the distinction.

39. (new) The method according to claim 32 further comprising the steps: forming an average value out of gas sensitive layer signals from times past; forming a reference value suitable for triggering a switching signal out of an

average value for the at each time actual gas sensitive layer signal;

suspending an average value formation for a time period of a switching on of a perturbing heating value.

40. (new) The method according to claim 39further comprising the step of:

taking a characterizing curve of the gas sensitive layer element into consideration for formation of the reference value.

41. (new) The method according to claim 33 further comprising the steps of:

suspending an average value formation;

maintaining an old reference value for such time period during which a value of the actual gas sensitive layer signal is smaller as compared with a reference value formed out of an average value for detection of oxidizable air content substances.

42. (new) The method according to claim 39 further comprising the steps of:

suspending an average value formation;

maintaining an old reference value for such time period during which a

value of the actual gas sensitive layer signal is smaller as a reference value formed out of an average value for detection of oxidizable air content substances.

43. (new) The method according to claim 39 further comprising the step of: taking a variable time period of averaging into consideration for formation of an average value.

44. (new) The method according to claim 33 further comprising the step of: performing a formation of a reference value by taking into consideration gas sensitive layer signals of times past, wherein the length of the time period taken into consideration is variable.

45. (new) The method according to claim 33 further comprising the steps of:

performing a formation of the reference value by taking into consideration reference values of times past, wherein the length of the time period taken into consideration in this context is variable.

46. (new) The method according to claim 43 further comprising the step of:

making a length of a time period taken into consideration dependent on a time behavior of the gas sensitive layer signal.

47. (new) The method according to claim 32 further comprising the steps of:

averaging the gas sensitive layer signal at the same time over two different time periods;

subtracting a certain amount from an average value formed over a longer time period;

triggering a switching signal, when an average value formed over a shorter time period becomes smaller than a value resulting from an averaging over the longer time period and subtraction of the certain amount.

48. (new) The method according to claim 32 further comprising the step of:

periodically and temporarily increasing a temperature of the heating structure;

comparing the gas sensitive layer signals prior to, during, and after each temperature increase for a qualitative determination of a presence of additional oxidizable or, respectively, reduceable air contents substances.

49. (new) The method according to claim 32 further comprising the step of:

employing a change of the impedance of the gas sensitive layer (33) for forming of the gas sensitive layer signal.

50. (new) The method according to claim 32 further comprising the step of: employing a change of an electrical resistance of the gas sensitive layer (33) for formation of the gas sensitive layer signal.

51. (new) The method according to claim 33 further comprising the steps of:

additionally determining a lower barrier for a reference value;

limiting the reference value from undershooting the lower barrier;

preventing the lower barrier from being reached by gas sensitive layer caused variations;

coordinating a gas concentration to this gas sensitive layer signal such that the gas concentration does not inflict permanent damage to the human being or, respectively, is disposed in a far safety distance relative to an explosion barrier in case of a monitoring of explosion limits.

52. (new) The method according to claim 32 further comprising the steps of: controlling the heating structure electrically through an external resistor;

dimensioning the external resistor such that the current flow in no case heats the sensor element to a set point temperature;

forming a voltage divider out of the external resistance and the heating structure.

53. (new) The method according to claim 32 further comprising the step of:

controlling a heating power delivered to the heating structure with a switching pulse.

54. (new) The method according to claim 52 further comprising the steps of:

forming a voltage at the voltage divider;

measuring the voltage at the voltage divider after a switching off of a heating power.